

# ENVIRONMENTAL MANAGEMENT PLAN (EMP)

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## General

This Environmental Management Plan (EMP) is produced as a complementary part of Detailed Design, as a free-standing document. It ensures incorporation of the relevant environmental factors into the overall subprojects design and will identify linkages to other safeguard policies relating to the subprojects.

## Mitigation Measures

Based on the preliminary assessment, key mitigation measures recommended under this EMP are listed as follows:

- a. Identify and locate on subprojects plans any sensitive natural resources in the subprojects area including but not limited to patches of natural habitat, bird colonies, and wet lands, unique plant communities etc. (consult with local nature protection authorities).
- b. Identify local access routes through and around cultivated land and pasture.
- c. Minimize requirements for temporary or permanent alteration of lands.
- d. Provide zones for preliminary accumulation of wastes that will cause no damage to the vegetation cover and other components of the environment.
- e. Transport and disposal of construction concrete rubble, debris and spoils in approved paths and landfills/ dumpsites.
- f. Delineate access roads/ work areas carefully and prevent their expansion.
- g. Rehabilitate access roads and work areas after work completion (scratch soil with special engine, put fertile topsoil in place, etc.).
- h. Use closed/covered trucks for transportation of construction materials.
- i. Clean the surrounding area from dust by water sprinkling, removal of excess materials and cleaning of sites upon completion of activities.
- j. Restoration to original conditions of landscape after completion of construction and rehabilitation works.
- k. Arrange necessary preservation measures (establish protection zones, by-pass these areas during transportation and other).
- l. Cease the works at once, historical and cultural monuments are encountered during earthworks and provide relevant information to the State Agency for Historical and Cultural Monuments Protection.
- m. Conduct mid-term and end-of-subprojects inspections to the sites during construction works.

The parameters, mitigation, monitoring and responsibility will be discussed in detail in the EMP.

## Residual Impact

Residual impacts are defined as those impacts that remain following the

# **ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

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implementation of the mitigation measures proposed. Residual impacts refer to those environmental effects predicted to remain after the application of mitigation outlined in this IEE. The predicted residual effects are considered for each Subprojects phase (Construction, Post Construction, Pre-Operations and Operation, as per the Impact screening presented in Table 5.1, the significance has been determined for each residual adverse effect.

## **Institutional Arrangements**

### **Management Responsibilities**

#### **Environmental and Social Management Unit**

For an effective compliance of an EMP, roles and responsibilities need to be defined at the onset, with relevant professionals hired as project team members at the executing or implementing agency (E/IA) levels. Moreover, these professionals are to be placed in the project hierarchy in such a way whereby they cannot be influenced by the operational teams (engineers, procurement, contractors, etc.) in order to lessen their compliance monitoring responsibilities.

For the project, an Environmental and Social Management Unit (ESMU) is proposed to be set up within the Project Director's (PD) Office at the E/IA level, with direct reporting line to the PD. An Environment Specialist and a Social Development Specialist will need to be a part of the ESMU so as to ensure compliance to both parts of the EMP.

The responsibilities of EMU will be the following, but not limited to:

- Ensure effective compliance of EMP as per ADB Safeguards Policy requirements
- Provide technical assistance to the Project Team, in matters related to EMP in particular, and to environmental and social safeguards as a whole
- Put in place reporting mechanism and monitoring regimes for project staff as well as contractors
- Ensure that EMP related clauses specifically, and environment related clauses in general, are part of all the tender/bid/RFP documents.
- Provide technical input to the various training programs proposed as a part of the EMP
- Ensuring that all regulatory clearances (for example, Pak EPA) have been obtained before starting civil works for the Subprojects.
- Conduct on site spot checks to check the compliance level, as well as for any outstanding issue not being covered by the EMP.

## ENVIRONMENTAL MANAGEMENT PLAN (EMP)

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- Regularly report to PD as well as ADB and EPA on progress related to EMP Compliance.

### **The Consultant**

The Construction Supervision Consultant (CSC) will ensure the implementation and regular monitoring of the EMP in true letter and spirit during execution of the civil works and shall submit periodic reports to ESMU of IA regarding the EMP implementation status. The Consultant Environmental Specialist and Social Specialist will be responsible for EMP implementation and reporting any non-compliances to the Engineer of the Project and the ESMU.

#### **a. The Contractor**

The contractor will be responsible for on-site implementation of the EMP of the sub-project environmental protection liabilities. They will be responsible for compliance of EMP provisions under contractual obligations. The contractor will train their crew/ staff in implementation of the EMP through capacity building interventions.

The EMP will be an integral part of the contract document. The bid should include a detailed environmental mitigation budget as part of the engineering costs of the respective works. Contractor will engage social and environmental managers to realize the above requirements.

The Contractor will submit the Site-Specific Environmental Management Plan (SSEMP) to the CSC and PMU for approval at least ten (10) days prior to commencement of the physical works.

#### **b. Environmental Management Plan**

The mitigation plan, being a key component of EMP includes measures to mitigate potential negative impacts and enhance its positive impacts during construction phase of the sub-project. The contractor is responsible for implementation of EMP with the co-operation of executing and implementing agencies, client staff, socio-environmental consultants and local community of the subprojects.

The Environmental management plan, shown in Table 6.1, which also covers monitoring, will therefore form the basis of the environmental and social protection measures implemented by ESMU and Engineering, Procurement and Construction (EPC) contractor that will be employed. The implementation of the EMP ensures that environmental, health and safety (EHS) and social performance is in accordance with national (PAK-EPA) and international (ADB Safeguard Policies) standards and best practice.

The **Table** 6.1 states the environmental management plan for the impacts along with mitigation plan, as well as the institutional responsibility.

**Table 6.1: Environmental Management (Mitigation) Plan (Construction & Operation)**

| Problem / Activity Impact                                       | Mitigation Measures   | Timing to Implement MM                                 | Performance Indicator   | Residual Impact   | Institutional Responsibility |
|---|---|--|---|---|------------------------------|
| <b>Pre-Construction</b>   |   |  |   |   |                              |
| Assure compliance with relevant construction field legislation. | <ul style="list-style-type: none"> <li>Acquire construction permit.</li> <li>Provide Water management guidelines if subprojects are executed near surface watercourse.</li> </ul>   | Before the construction of the subprojects activities. | <ul style="list-style-type: none"> <li>Number of reported non-compliances</li> </ul>  | Minimization and continued improvement in number of reported noncompliance's      | PMU/ Consultant              |
| <b>Construction Stage Impacts</b>                               |   |  |   |   |                              |
| <b>Impacts on Land Resources</b>                                |   |  |   |   |                              |
| Excavation and Blasting   | <ul style="list-style-type: none"> <li>Protects Top six-inch soil before excavation</li> <li>Blasting may be done where it is absolutely necessary</li> <li>Use safety measures in handling explosives</li> <li>Prepare blasting schedules along with warning sirens, and ensure minimum damage to the landscape.</li> <li>Alternatives to blasting, such as hydraulic hammers or other mechanical methods are preferred wherever applicable;</li> <li>The correct burning of the explosive,</li> <li>A consistent blasting schedule by Contractor, minimizing blast-time changes; specific warning to alert all workers and third parties in the surrounding areas (e.g local communities).</li> <li>Trained personnel are handling explosives and safety management has been considered;</li> <li>Blasting-permit procedures has been followed; and,</li> <li>Blasting sites are checked post-blast by qualified personnel of Contractor for malfunctions and unexploded blasting agents, prior to resumption of work.</li> </ul> | During Construction                                    | <ul style="list-style-type: none"> <li>Implementation of SSEMP before start of works</li> <li>Annual reports and documentation of safety inspection</li> <li>Workforce /Community complaints</li> </ul> | Not Significant (Minimal)<br>Target = zero<br>Threshold 1, with agreed mitigation | Contractor/ Consultant       |

| Problem / Activity Impact        | Mitigation Measures  | Timing to Implement MM  | Performance Indicator  | Residual Impact           | Institutional Responsibility                   |
|----------------------------------|--|---|--|---------------------------|--|
| Waste Management                 | <ul style="list-style-type: none"> <li>• Proper Waste Management at Construction sites and Labour Camps.</li> <li>• Waste should be classified before disposal</li> <li>• Solid waste generated should be reduced, reused and recycled.</li> <li>• Rubbishes from the subprojects construction area and office area shall be classified and collected and then treated by burial in a centralized manner.</li> <li>• The landfill site area shall be equipped with seepage control system, leachate drainage system, gas conduction system, peripheral water drainage and interception, flood drainage and leachate collection processing facilities, etc</li> </ul> | During designing stage no later than pre-qualification or tender negotiations | <ul style="list-style-type: none"> <li>• EPC's Site officer and EHS officer in place</li> <li>• SSEMP including Waste Management Plan</li> <li>• Zero Complaints from Community &amp; Workers</li> <li>• Internal auditing and reporting by EPC</li> </ul> | Not Significant (Minimal) | Contractor with the cooperation of consultant. |
| Labor camps and material storage | <p>Contractor will</p> <ul style="list-style-type: none"> <li>• Locate the labor camps and stores, at least 500 m away from the site and local population at a secure location.</li> <li>• Sanitation system along with solid and liquid waste management system will be put in place<br/>Latrines with septic tanks and land fill site for solid waste will be identified and constructed.</li> </ul>   | During construction   | <ul style="list-style-type: none"> <li>• Monthly Reports (EPC)</li> <li>• Supervision by Consultant</li> <li>• EHS officer implementing SSEMP<br/>Information Events for work force</li> </ul>   | Not Significant (Minimal) | Contractor & Supervised by Consultant          |

| Problem / Activity Impact   | Mitigation Measures  | Timing to Implement MM  | Performance Indicator  | Residual Impact                  | Institutional Responsibility                     |
|---|--|---|--|----------------------------------|--|
| <p>Soil pollution due to oils and lubricants / equipment poor maintenance and repairs / refueling at the construction site.</p> | <ul style="list-style-type: none"> <li>• Avoid servicing and re-fuelling at the site.</li> <li>• Use protective foils and spill prevention trays during possible vehicle re-fuelling and maintenance at the construction site.</li> <li>• Regular inspection will be carried out to detect leakages in construction vehicles and equipment.</li> <li>• Fuels and lubricants will be stored in covered and dyked areas, underlain with impervious lining.</li> <li>• Spill control kit (shovels, plastic bags and absorbent materials) will be available near fuel and oil storage areas.</li> <li>• Contaminated soil will be removed from the site and disposed in a manner to ensure protection of water resources.</li> <li>• Use silt traps to prevent contamination of river and streams.</li> <li>• Provide absorbing material in case of fuel spills.</li> <li>• Used oil/ oily materials and agents should be managed in line with the Waste management plan.</li> <li>• Procedure in place for actions in case of incidental oil and lubrication spills.</li> <li>• Prepare and implement the Construction Site Organization Plan that incorporates good construction practice measures, measures from water management documents and measures from the Water management plan.</li> </ul> | <p>Because the area can be subject to un seasonal heavy rain plan before and during construction (cut and fill, land reclamation etc.) while considering the climatic conditions.</p> | <p>Spill contingency plan is available at site<br/>                     Properly paved/cemented mechanical workshop<br/>                     No water bodies near the working area<br/>                     Staff Training over oil spillage<br/>                     All the vehicles and machinery seals are intact<br/>                     Containers are available for used oil</p> | <p>Not Significant (Minimal)</p> | <p>Contractor &amp; Supervised by Consultant</p> |

| <b>Problem / Activity Impact</b> | <b>Mitigation Measures</b>   | <b>Timing to Implement MM</b>      | <b>Performance Indicator</b>   | <b>Residual Impact</b>    | <b>Institutional Responsibility</b>   |
|----------------------------------|--|------------------------------------|--|---------------------------|---------------------------------------|
| Agriculture Land Damage          | <ul style="list-style-type: none"> <li>• Top six inches soil will protected and will be spread back after completion of construction work</li> <li>• Compensation will be paid to the affected person for agricultural land/crops damage</li> <li>• Avoid use of heavy machinery within agricultural land as far as possible.</li> </ul>   | Construction and post construction | <ul style="list-style-type: none"> <li>• Monthly Reports (EPC)</li> <li>• Supervision by Consultant</li> <li>• EHS officer implementing SSEMP</li> <li>• Information Events for work force</li> </ul>  | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| Earth borrow site                | <ul style="list-style-type: none"> <li>• No private land will be acquired for the borrow areas.</li> <li>• The Contractor will ensure that selected borrow areas on irrigation land are clearly demarcated and approved by the engineer including the allowed depth of the excavation before starting excavation.</li> <li>• The borrow areas will be leveled. The Contractor will not leave the borrow pits in such a condition that they are unsuitably filled with rain water and cause the problem for the community.</li> <li>• If the borrow area is near to the settlements, then it should be fenced completely.</li> <li>• If agriculture land needs to be used as borrowing area, then the Contractor will adopt the following methods during the digging process.</li> <li>• Fix the location of excavation.</li> <li>• Remove thirty centimeters of the top soil and keep it on reserved site for re-spreading in the field.</li> <li>• Excavate up to one meter depth.</li> <li>• Maintain the slope as far as possible.</li> <li>• Place the top soil back during the restoration</li> <li>• Pay compensation for any damages/ crop losses.</li> </ul> | Construction and post construction | Top soil management<br>Government approved site<br>Approval for any other site by RE and Government<br>Borrow area management generated and implemented<br>Agreement in case of private land owner<br>Grievance redress Mechanism<br>Leveling of Borrow Area | Minor \Reduced            | Contractor & Supervised by Consultant |

| Problem / Activity Impact  | Mitigation Measures  | Timing to Implement MM                    | Performance Indicator   | Residual Impact  | Institutional Responsibility                                      |
|--|--|---|---|--|---|
| Change in Soil characteristics e.g. soil erosion, contamination and compaction       | <ul style="list-style-type: none"> <li>Restrict vehicle speeds to 30km/h.;</li> <li>Restriction on repair of vehicles and equipment in the field.</li> <li>The compacted soil will be reversed to its original state in which it was occupied.</li> <li>Pictures of the area should be taken prior to handing it over to contractor</li> </ul> | During construction                       | <ul style="list-style-type: none"> <li>Monthly Reports (EPC)</li> <li>Supervision by Consultant</li> <li>EHS officer implementing SSEMP</li> <li>Information Events for work force</li> </ul> | Not Significant (Minimal)  | Contractor & Supervised by Consultant                             |
| Construction material leftovers of after the closure of temporary construction sites | <ul style="list-style-type: none"> <li>All shivers and material that remain after the closure of temporary construction sites are to be removed from the location and re-used/re-cycled where possible.</li> <li>All remains are to be disposed of in a manner that will not be harmful to environment.</li> </ul>                             | Completion of Construction                | <ul style="list-style-type: none"> <li>Site Inspection</li> <li>Implementation of Environmental Enhancement Program</li> </ul>  | Not Significant (Minimal)<br>Short term during construction phase<br><br>Beneficial in long terms with the implementation of Environmental Enhancement Program | Contractor & supervised by Consultant                             |
| <b>Impacts on Hydrology and Water Resources</b>                                      |  |   |   |  |   |
| Water quality and sedimentation load   | <ul style="list-style-type: none"> <li>Quarterly water sampling and testing will be conducted to ascertain water quality during different seasons.</li> <li>Samples at locations upstream and downstream of the subproject will be collected for testing</li> </ul>  | During Construction and Post Construction | <ul style="list-style-type: none"> <li>Plan to be developed before completion of construction</li> <li>Quarterly Water Monitoring Reports by EPA certified Laboratory</li> </ul>              | Not Significant (Minimal)  | Contractor & Supervised by Consultant /FATA Irrigation Department |



| Problem / Activity Impact                         | Mitigation Measures   | Timing to Implement MM                                     | Performance Indicator  | Residual Impact           | Institutional Responsibility          |
|---|---|--|--|---------------------------|---------------------------------------|
| Surface water contamination due to washing etc.   | <ul style="list-style-type: none"> <li>Contractor will demarcate a washing area for all sorts of washing activities, with running water facility connected to a dedicated drain flowing into the septic tanks</li> <li>Restriction on servicing of vehicles and equipment at site</li> <li>Construction works should be executed in a way that surface and natural contents outside the subprojects are not damaged and that works are performed so that watercourses are not unnecessarily made turbid and watercourses discontinued.</li> <li>Works should be executed in dry weather.</li> <li>Prepare and implement a construction site organization</li> </ul> | During construction  | <ul style="list-style-type: none"> <li>EPC's Monthly Reports</li> <li>Record of Water consumption</li> <li>Monthly Water Monitoring Reports by EPA certified Laboratory</li> </ul>       | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| Drinking Water supply                             | <ul style="list-style-type: none"> <li>Contractor will get stream water tested for chemical and biological contaminants, and assist in providing filtration to make water drinkable.</li> <li>The contractor to make his own arrangements for water required for construction ensuring that water availability and supply to nearby communities remain unaffected like new water well, sufficient yield available in existing water wells, etc.).</li> <li>Prior approval to be obtained from Subprojects Engineer for water usage</li> <li>Maintain record of water consumption</li> </ul>   | Before construction and during the subprojects activities. | <ul style="list-style-type: none"> <li>Documentation of audit and remedial actions where necessary</li> <li>Grievance's record (Target=0, Threshold 1 with agreed mitigation)</li> </ul> | Not Significant (Minimal) | Contractor/CONSULTANT                 |
| Municipal solid and liquid Waste                  | <ul style="list-style-type: none"> <li>Contractor will ensure solid waste bins are placed at labor eating and resting areas.</li> <li>Installation of field toilets for workers with septic tanks</li> </ul>  | During construction  | <ul style="list-style-type: none"> <li>Implementation of SSEMP</li> <li>Site auditing</li> <li>Grievance's record (Target=0, Threshold 1 with agreed mitigation)</li> </ul>              | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| <b>Impacts on Air Quality and Noise Pollution</b> |   |  |  |                           |                                       |

| Problem / Activity Impact                     | Mitigation Measures   | Timing to Implement MM   | Performance Indicator   | Residual Impact           | Institutional Responsibility          |
|---|---|--|---|---------------------------|---------------------------------------|
| Dust/smoke Emission from plants and equipment | <ul style="list-style-type: none"> <li>• Compact deposited earth material.</li> <li>• Sprinkle dust sources with water in order to reduce impacts on the surrounding population and vegetation.</li> <li>• Control the speed of vehicles in order to reduce dust rising.</li> <li>• Prepare and implement a plan for the construction site organization that includes good construction management practices.</li> <li>• The stock piles should be covered or kept moist in dry weather and to be located in such a distance, so that the communities are not affected by upwind of the stockpiles.</li> <li>• Use earth material with the approval of the Engineer.</li> <li>• Procure shingle/ stone from quarry site approved by the Engineer.</li> <li>• Regular inspection, tuning, and maintenance of transport vehicles.</li> <li>• Material transport in closed containers or covered with canvas (Tarpal) sheets.</li> <li>• Regular equipment maintenance.</li> <li>• The contractor is obliged to submit evidence of vehicle roadworthiness in line with the regulations on the hazardous gases emission.</li> <li>• Prepare and implement the construction site organization plan that incorporates good construction practice measures.</li> </ul> | During Construction. Water sprinkling to be done on regular/daily basis. | <ul style="list-style-type: none"> <li>• Water sprinkling Records</li> <li>• Monthly reports EPC</li> <li>• Site Inspection and Audits</li> <li>• Monthly Monitoring Reports by EPA certified Laboratory</li> </ul> | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| Smoke from burning of waste or firewood       | <ul style="list-style-type: none"> <li>• Contractor shall strictly ban burning of waste or of wood, especially extracted from nearby shrubs and bushes.</li> <li>• He must provide clean fuel to the labor to use for their daily purposes i.e LPG gas cylinders</li> </ul>   | During construction  | <ul style="list-style-type: none"> <li>• EPC's Site officer and EHS officer in place</li> <li>• SSEMP Implementation</li> <li>• Internal auditing and reporting by EPC</li> </ul>                                   | Not Significant (Minimal) | Contractor & Supervised by Consultant |

| Problem / Activity Impact   | Mitigation Measures  | Timing to Implement MM   | Performance Indicator  | Residual Impact           | Institutional Responsibility          |
|---|--|--|--|---------------------------|---------------------------------------|
| Noise in the operation of heavy mechanization and generators.     | <ul style="list-style-type: none"> <li>Observe law-defined working hours at the construction site.</li> <li>Make the generator casings sound proof if they are located near residential units.</li> <li>Ensure mufflers for heavy machinery.</li> <li>Prepare and implement the construction site organization plan that incorporates good construction practice measures. Regular inspection of equipment and machineries</li> </ul>  | Maximum allowable noise levels should be below 80 dB (A) LEQ at the boundary of the construction site. To be monitored once a month. | <ul style="list-style-type: none"> <li>EPC Site Manager and EHS Officer in Place</li> <li>Audit and Inspection record of heavy mechanization and generators.</li> <li>Monthly Noise level Monitoring Reports by EPA certified Laboratory</li> <li>No. of Grievance's (Target=0)</li> </ul> | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| Dust Emission from Stone quarrying and Transportation of material | <ul style="list-style-type: none"> <li>Using trucks with awning and special vehicles depending on the type of materials.</li> <li>During the transportation of soil, the trucks must be covered with Tarpaulin.</li> <li>Use earth material with the approval of the Engineer</li> <li>Procure shingle/ stone from quarry site approved by the Engineer.</li> <li>Regular inspection, tuning, and maintenance of transport vehicles.</li> <li>Material transport in closed containers or covered with canvas (Tarpal) sheets.</li> <li>Avoid night time activity.</li> <li>Maintain liaison with communities; Repair of damaged roads/ other infrastructure.</li> <li>Transportation of material during off peak hours.</li> </ul> | During construction.   | <ul style="list-style-type: none"> <li>Recording of violations and corrective measures</li> <li>Performance of Regular Driver Training (target 100% participation of drivers)</li> <li>Instruction and Information Events for workforce</li> <li>No. of accidents (Target=0)</li> </ul>    | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| <b>Impacts on Biological Resources</b>                            |  |  |  |                           |                                       |

| Problem / Activity Impact | Mitigation Measures   | Timing to Implement MM   | Performance Indicator  | Residual Impact  | Institutional Responsibility          |
|---------------------------|---|--|--|--|---------------------------------------|
| Damage to Flora and Fauna | <ul style="list-style-type: none"> <li>• No cutting or removal of trees.</li> <li>• As per Environmental Safeguard policy, sufficient amount has been allocated for tree plantation for better environment. For this purpose a tree plantation plan will be prepared including the type of species, location for plantation and other necessary information. This plan will also compensate any unlikely tree cutting involved during subprojects implementation. Selection of borrow area with least vegetation cover. Soft start for allowing time to reptiles to move away from the subprojects site</li> <li>• Restriction and prohibition on hunting, shooting, trapping, and poaching of wild species</li> <li>• Construction during non-migratory season</li> <li>• No night time activity</li> <li>• Photographs of pre and post subprojects</li> </ul> | Rerouting and site identification during design stage and other matters during construction of relevant activities | <ul style="list-style-type: none"> <li>• EPC internal monitoring and monthly reports</li> <li>• Site auditing</li> <li>• Photographic record of pre and post subprojects</li> <li>• Implementation of Environmental Enhancement Program</li> </ul> | Not Significant (Minimal) during construction phase<br><br>Beneficial in long terms with the implementation of Environmental Enhancement Program | Contractor & Supervised by Consultant |

| Problem / Activity Impact | Mitigation Measures  | Timing to Implement MM             | Performance Indicator  | Residual Impact | Institutional Responsibility          |
|---------------------------|--|------------------------------------|--|-----------------|---------------------------------------|
| Impact on aquatic life    | <ul style="list-style-type: none"> <li>• Monitor water flow during construction and maintain the minimum ecological requirement for all rivers to ensure water is available downstream all the time.</li> <li>• Maintain the desired hydrological connectivity in the system (upstream-downstream and maintain low water temperature necessary for survival of the moderately flow-sensitive species found at this site;</li> <li>• Ensure riverine protection through observing the 6-30m away from the river banks and planting of indigenous riparian trees to reduce sedimentation.</li> <li>• Provide compensation and sediment channels in the weir as well as physical removal of sediment.</li> <li>• Minimize activities to areas of construction and initiate habitat restoration immediately after construction works are through; and</li> <li>• Restore disturbed areas to near-to-nature to blend with the immediate environment.</li> <li>• Shorten the periods of temporary diversions as far as feasible.</li> <li>• Oil spill containment and clean-up equipment should always be available at the construction site with trained response team.</li> <li>• Systematic search, capture and safe release of species inhabiting the right of way (for the weir structures).</li> </ul> | Construction and Post construction | <ul style="list-style-type: none"> <li>• Artificially extreme low flows or extended low flows.</li> <li>• Reduction in widths, depths, velocities.</li> <li>• River continuity for fish spawning reduced or interrupted.</li> <li>• Increased likelihood of temperature &amp; oxygen level extremes</li> </ul> | Minimal         | Contractor & Supervised by Consultant |

| Problem / Activity Impact  | Mitigation Measures   | Timing to Implement MM  | Performance Indicator   | Residual Impact   | Institutional Responsibility  |
|--|---|---|---|---|---|
| <p>Protected Areas Safety requirements (Wet land and forest Protected areas)</p> | <ul style="list-style-type: none"> <li>• Restrict access to environmentally sensitive areas and buffer areas by people and their pets, for example through the use of coarse woody debris, plantings, signs and fencing.</li> <li>• Use signage and other educational tools to inform people about the ecological importance of environmentally sensitive areas.</li> <li>• Identify environmentally sensitive areas and buffers in the field by clearly marking these areas with high visibility protection fencing</li> <li>• Post a site map of environmentally sensitive areas at the entrance to the worksite where workers are sure to see it.</li> <li>• Use informational signage and other means to explain the importance of protection measures and the need to avoid any activity in environmentally sensitive areas, including clearing, disturbing, or storing construction materials in this area.</li> <li>• Schedule construction activities to avoid sensitive periods such as bird nesting. Check timeframes with an appropriately qualified professional.</li> <li>• Maintain snags and woody debris in buffer areas and environmentally sensitive areas to provide habitat for a diversity of wildlife.</li> <li>• Prevent movement of silt laden waters into environmentally sensitive areas by using sediment control techniques.</li> <li>• Maintain effective fuelling facilities well away from environmentally sensitive areas to prevent contamination.</li> <li>• The noise will be maintained at project construction site for aquatic fauna etc, with mitigation measures adopted as mentioned above.</li> </ul> | <p>During the construction and operation stages, especially Shukrata subproject area.</p> | <ul style="list-style-type: none"> <li>• Site Inspection</li> <li>• Implementation of Environmental Enhancement Program</li> <li>• Implementation of Construction Site Organization Plan</li> </ul> | <p>Not Significant (Minimal)<br/>Short term during construction stage</p> | <p>Contractor &amp; Supervised by Consultant<br/>Wild life/Forest department of District Bajaur</p> |
| <p><b>Impacts on Socioeconomic and Cultural Issues</b></p>                       |   |   |   |   |   |

| Problem / Activity Impact   | Mitigation Measures   | Timing to Implement MM  | Performance Indicator   | Residual Impact           | Institutional Responsibility                               |
|---|---|---|---|---------------------------|--|
| Tribal tensions and rivalries   | <ul style="list-style-type: none"> <li>• Ensure continuous liaison with the communities throughout the construction of the subprojects by the subproject team and Social Organizers of PIU, so as to identify any such incident in time.</li> <li>• Relevant political authorities will be kept abreast of the progress, as well as any such issue if in making.</li> </ul> | Before and During construction  | <ul style="list-style-type: none"> <li>• Continued Community Consultation Records</li> <li>• Implementation of Community Liaison Plan by EPC</li> <li>• No. Of Grievance's (Target=0)</li> </ul>  | Not Significant (Minimal) | Contractor & Supervised by Consultant                      |
| Impact on the existing civil infrastructure and facilities, especially underground installations (water supply and sewerage pipeline etc.) which cause obstacles in the provision of services to consumers. | <ul style="list-style-type: none"> <li>• Precisely situate the position of infrastructure and underground installations at the local works in cooperation with the relevant institutions at all levels of authority.</li> <li>• Close liaison with local relevant authorities</li> </ul>  | Before the construction of the weir and all other structures, the APs should be given sufficient time and compensation to satisfy them. | <ul style="list-style-type: none"> <li>• Continued Community Consultation Records</li> <li>• No. Of Grievance's (Target=0)</li> <li>• Monthly Reports on Information activities and response from community</li> <li>• Liaison Records with local relevant authorities</li> </ul> | Not Significant (Minimal) | Consultant / EMU in cooperation with concerned Department. |

| <b>Problem / Activity Impact</b>  | <b>Mitigation Measures</b>   | <b>Timing to Implement MM</b>   | <b>Performance Indicator</b>   | <b>Residual Impact</b>    | <b>Institutional Responsibility</b>   |
|---|--|---|--|---------------------------|---------------------------------------|
| Increased possibility of employment and income in the local community.        | <ul style="list-style-type: none"> <li>• Prioritize qualified local population in employment.</li> </ul>   | At the time of commencement of subprojects. Complaints of APs to be solved as soon as possible.                       | <ul style="list-style-type: none"> <li>• Job Posting and information in local communities</li> <li>• Transparency of employment procedures and records</li> <li>• Monthly Reports on Information activities and response from community</li> <li>• Up to date information on employment opportunities</li> </ul> | Highly Beneficial         | Contractor/consultant                 |
| Conflict due to use of privately owned agriculture land for camp construction | <ul style="list-style-type: none"> <li>• Establishment of camp on community owned barren leveled land/RoW away from population at least 500m away.</li> <li>• Approval of camp site from the Engineer will be obtained.</li> </ul>   | Before the construction of the subprojects, the APs should be given sufficient time and compensation to satisfy them. | <ul style="list-style-type: none"> <li>• Approval (NOC) of camp site before construction.</li> </ul>   | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| Social conflicts due to influx of external workforce                          | <ul style="list-style-type: none"> <li>• Establishment of camp on community owned barren land away from population at least 500m away.</li> <li>• Contractor need to obtain approval from the Engineer.</li> <li>• Hiring of work force from local communities; Awareness raising of residents for safety protection.</li> <li>• Awareness raising of labor to ensure respect for local customs and norms.</li> <li>• Child labor will be prohibited at sub-project sites.</li> <li>• Maintain record of all resources usage like water, fuel, manpower, machinery, equipment, etc.</li> </ul> | During the construction activities.   | <ul style="list-style-type: none"> <li>• Up to date information on employment opportunities</li> <li>• Job Posting Records</li> <li>• Information Events Record</li> <li>• EPC Monthly Reports</li> <li>• Site Audit Reports</li> </ul>  | Not Significant (Minimal) | Contractor & Supervised by Consultant |



| Problem / Activity Impact  | Mitigation Measures  | Timing to Implement MM   | Performance Indicator   | Residual Impact   | Institutional Responsibility          |
|--|--|--|---|---|---------------------------------------|
| Conflicts arising due to Mixing of local and migratory job seekers.        | <ul style="list-style-type: none"> <li>• Preference to provide jobs to local job seekers.</li> <li>• Motivation/Trainings to the workers for a peaceful work environment.</li> </ul>   | Before and during the construction of subprojects.   | <ul style="list-style-type: none"> <li>• Up to date information on employment opportunities</li> <li>• Job Posting Records</li> <li>• Information Events Record</li> <li>• EPC Monthly Reports</li> <li>• Site Audit Reports</li> </ul>           | Not Significant (Minimal)   | Contractor/ Consultant                |
| Reduced possibility through the area where the works are executed.         | <ul style="list-style-type: none"> <li>• Plan the relocation of equipment at time when daily traffic is not jammed; provide alternative passage for pedestrians and vehicles in cooperation with local authorities or provide a safe passage through the construction site.</li> <li>• Avoid roads through inhabited areas especially near schools and hospitals.</li> <li>• Prepare and implement the Construction Site Organization Plan that incorporates good construction practice measures.</li> </ul> | Necessary evacuations to be done as when necessary if construction impacts are of significant duration and close to APs. | <ul style="list-style-type: none"> <li>• Implementation of Construction Site Organization Plan</li> <li>• Health and safety Plans in Place and Implemented</li> <li>• Site Audit</li> </ul>   | Not Significant (Minimal)   | Contractor & Supervised by Consultant |
| Population at increased risks of traffic accidents and construction works. | <ul style="list-style-type: none"> <li>• Assure adequate warning signs, lighting, protective fencing etc.</li> <li>• Observe traffic rules.</li> <li>• Clean construction waste from the construction site both in the construction phase and after works completion, when closing the construction site.</li> <li>• Assure medical supplies and aid through institutional and administrative arrangements with municipal hospitals at the construction site.</li> </ul>                                     | Prior to and throughout the construction.  | <ul style="list-style-type: none"> <li>• Implementation of SSEMP, Traffic Management Plan</li> <li>• Accident/Incident Record</li> <li>• Implementation of Construction Site Organization Plan</li> <li>• Site Audits &amp; Inspection</li> </ul> | Not Significant (Minimal)<br>Short term during construction stage | Contractor & Supervised by Consultant |

| Problem / Activity Impact                                     | Mitigation Measures   | Timing to Implement MM                        | Performance Indicator   | Residual Impact           | Institutional Responsibility          |
|---|---|---|---|---------------------------|---------------------------------------|
| Risk of injuries at work                                      | <ul style="list-style-type: none"> <li>• Demand from all workers to abide by the Protection at work measures.</li> <li>• Provide protective equipment; install warning signs at the construction site.</li> <li>• Prepare and implement the Construction site Organization Plan and Protection at work measures plan.</li> </ul>  | Prior to commencement and during construction | <ul style="list-style-type: none"> <li>• Site Inspection</li> <li>• Monthly EPC Reports</li> <li>• PPEs issuance records</li> <li>• Health and safety Plans in Place and Implemented</li> <li>• Implementation of Construction Site Organization Plan</li> </ul>          | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| Accident risks  | <ul style="list-style-type: none"> <li>• Preparation and implementation of HSE Plan.</li> <li>• Provision of PPEs.</li> <li>• Provision of first aid kits and emergency vehicle.</li> <li>• Emergency response teams.</li> <li>• Preparation of emergency response plans</li> </ul>   | Prior to commencement and during construction | <ul style="list-style-type: none"> <li>• Monthly EPC Reports</li> <li>• PPEs issuance records</li> <li>• Health and safety Plans in Place and Implemented</li> <li>• Implementation of Construction Site Organization Plan</li> <li>• Accident/Incident Record</li> </ul> | Not Significant (Minimal) | Contractor & Supervised by Consultant |
| Health risks due to unsafe and unhygienic living environment. | <ul style="list-style-type: none"> <li>• Preparation and implementation of HSE Plan. Safety measures taken by the contractor such as installation of firefighting equipment, safe storage of hazardous material, fencing, provision of first aid facilities etc.; Contingency measures in case of accidents; Obligatory insurance of contractor's staff and laborers against accidents; Provision of adequate sanitation, washing, lighting, cooking and dormitory facilities. HSE trainings to construction and camp staff.</li> </ul> | During construction                           | <ul style="list-style-type: none"> <li>• Workplace Risk Assessment before start of works</li> <li>• Health and safety Plans in Place and Implemented</li> </ul>   |                           | Contractor & Supervised by Consultant |

| Problem / Activity Impact   | Mitigation Measures  | Timing to Implement MM | Performance Indicator   | Residual Impact  | Institutional Responsibility          |
|---|--|------------------------|---|--|---------------------------------------|
| EHS Training  | <ul style="list-style-type: none"> <li>Arrange training, guidelines and brushes in Urdu to staff and laborers about the Environment, Health and Safety.</li> </ul>   | During construction    | <ul style="list-style-type: none"> <li>EHS Trainings and Events Record</li> </ul>   | Not Significant (Minimal)  | Contractor & Supervised by Consultant |
| <b>Operation Stage Impacts and Maintenance (O&amp;M)</b>                  |  |                        |   |  |                                       |
| Change in visual character and soil erosion                               | <ul style="list-style-type: none"> <li>Restoration and Environmental enhancement plan to be prepared.</li> <li>Use of borrow areas with Engineer's approval at specified depth.</li> <li>Limited movement of machinery.</li> <li>Documentation of area.</li> <li>Ensuring areas under crops are not used as borrow areas.</li> <li>Leveling and dressing of borrow areas; Water sprinkling.</li> <li>Rescue of any encountered species.</li> </ul> | Pre Operations         | <ul style="list-style-type: none"> <li>Implementation of Environmental enhancement plan</li> <li>EPC Construction Completion Report</li> <li>Site Inspection</li> </ul> | Not Significant (Minimal)<br>Short term during construction phase<br><br>Beneficial in long terms with the implementation of Environmental Enhancement Program | Consultant & EMU                      |
| Soil pollution due to excessive application of fertilizers and pesticides | <ul style="list-style-type: none"> <li>Agriculture extension programs targeting use of Integrated Pest Management (IPM), green manure, and limiting use of pesticides to required levels only will target farmer communities to inform and train them</li> </ul>   | Post Construction      | <ul style="list-style-type: none"> <li>Agriculture extension program developed before completion of construction</li> </ul>   | Minor  | FATA Agriculture Directorate          |
| Use of irrigation water for cultivating high delta crops                  | <ul style="list-style-type: none"> <li>Cultivation of high delta crops will be strictly discouraged.</li> <li>Cropping pattern in accordance with the water balance model will be suggested and promoted.</li> </ul>   | Post construction      | <ul style="list-style-type: none"> <li>Agriculture extension program developed before completion of construction</li> </ul>   | Not Significant (Minimal)  | FATA Agriculture Department           |

| <b>Problem / Activity Impact</b>     | <b>Mitigation Measures</b>   | <b>Timing to Implement MM</b> | <b>Performance Indicator</b>   | <b>Residual Impact</b>  | <b>Institutional Responsibility</b> |
|--------------------------------------|--|-------------------------------|--|---|-------------------------------------|
| Strategies that require development. | An 'Operation Environmental Action Plan' (OEAP) needs to be prepared demonstrating the manner in which the Contractor/Operator will comply with the requirements of management plans proposed in EMP.<br>The following strategies and procedures will be developed prior to the commencement of Subprojects operations:<br>Subprojects specific security and public access control strategy;<br>Subprojects specific waste management strategy<br>Subprojects specific air and noise control strategy;<br>Subprojects specific traffic control strategy; | Pre Operations                | <ul style="list-style-type: none"> <li>Implementation Operation Environmental Action Plan' (OEAP)</li> </ul> | Beneficial in long terms with the implementation of Operation Environmental Action Plan' (OEAP) | Consultant & EMU                    |
| Monitoring programmes                | The following monitoring programmes will be developed prior to the commencement of Subprojects operations:<br>Landslide monitoring;<br>Water quality monitoring<br>Watershed and flood telemetry monitoring  | Operational stage             | Site Inspection Monitoring Reports <ul style="list-style-type: none"> <li></li> </ul>                        | Beneficial in long terms with the implementation of Operation Environmental Action Plan' (OEAP) | FATA Irrigation Department          |
| Training/ educational programmes.    | The following educational programmes will be developed prior to the commencement of Subprojects operations: <ul style="list-style-type: none"> <li>Employee induction programme on environmental awareness;</li> <li>Employee code of conduct;</li> </ul> Health and Safety training programme   | Operational stage             | Implementation of Training Events and Programs   | Highly Beneficial   | FATA Irrigation Department          |

**MM:** Mitigation Measures

**Monitoring Activities**

For each of the environmental components, the monitoring plan specifies the parameters to be monitored; location of the monitoring sites and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities.

In addition to the critical locations selected during design stage, the environmental monitoring will also be done at the construction camp site and any other plant site as determined relevant during rehabilitation works stage.

**A.1.1 Performance Indicators**

A key aspect of monitoring is defining relevant indicators. A performance indicator is a measurable value that demonstrates how effectively the EMP is achieving its key objectives, evaluated against the criteria defined in environmental management Plan.

**Table 6.2 Environmental Monitoring**

| S. No | Parameter     | Frequency  |
|-------|---------------|--|
| 1     | Water Quality | Quarterly for the following parameters;<br>1. Total Coli form<br>2. E. coli<br>3. pH<br>4. Total Dissolved solids (TDS)<br>5. Total Hardness as CaCO <sub>3</sub><br>6. Sodium<br>7. Potassium<br>8. Sulphate<br>9. Chloride<br>10. Alkalinity<br>11. Color<br>12. Odor<br>13. Taste<br>14. Nitrogen-Nitrates<br>15. TSS |
| 2     | Air Quality   | Quarterly and whenever required in an emergency for the following parameters<br>1. Carbon Monoxide (CO)<br>2. Sulfur Dioxide (SO <sub>2</sub> )<br>3. Nitric Oxide (NO)<br>4. Nitrogen Dioxide (NO <sub>2</sub> )<br>5. PM <sub>10</sub><br>6. PM <sub>2.5</sub>   |
| 3     | Noise Quality | Quarterly and whenever required in an emergency or exceeding the NEQS limits   |

**Subprojects Enhancement Plans**

**A.1.2 Restoration Plan**

If during construction, further material is required or contractor needs to borrow material from any other site, then the contractor can acquire private land in accordance with the lease agreement with the land owner. Photographic record

will be kept before and after the land use as borrowing area. The contractor will not leave borrowing pit in such a condition that they are unusable and could be filled with rain water and provide breeding place for mosquitoes or cause any health and safety issues. Agricultural land should be restored such that it can be re-used for the agricultural purpose. The topsoil of agricultural land, if used as borrow area, should be removed up to 6 inches and kept separate on site for its re-spread back on the leveled borrow area. After removal of top soil, excavation may be done up to maximum 3 feet (0.9144 m). Then the site area should be leveled for placing the topsoil back.

### **A.1.3 Reports**

The contractor shall submit weekly checklist report on the basis of which the Environmental Specialist of the Construction Supervision Consultant (CSC) shall produce monthly reports as well as inspection notes based upon the visits to the subprojects site. This information shall make a basis for Project Management Unit (PMU) for their further reporting or visiting the site. All reports shall be location and activity specific. The reports shall especially identify areas of contractor's noncompliance with the EMP and provide guiding remarks on actions to be taken. The significance of the non-compliance shall also be noted. Copies of these reports shall be sent to the Resident Engineer (RE) who shall forward them to the team leader, Head PIU and the contractor for their action(s). The RE will include in routine reports a summary status of activities relating to the EMP. Supplemental reports on issues should also be prepared as and when required.

The consultant's environmental team will produce monthly reports as well as a final report of the subprojects based on the information collected. The Table of Contents (TOC) is annexed as Annex-V. The list of distribution reports is given in Table 6.3.

**Table 6.3: Distribution of Reports**

| Report                        | Prepared by   | Reviewed by  | Distribution                 |
|-------------------------------|---|--|------------------------------|
| Weekly                        | Contractor's HSE/Environment officer                                  | Contractor's Environment Officer and Consultant's Environment Specialist | Resident Engineer            |
| Monthly<br>Effects Monitoring | Environment team of the Design & Construction Supervision Consultants | PMU's Environment Specialist   | Project Director             |
|                               | Environment team of the Design & Construction Supervision Consultants | PMU's Environment Specialist   | Project Director             |
| Change Management             | Environment team of the Design & Construction Supervision Consultants | PMU's Environment Specialist   | Project Director             |
| Biannual                      | Environment team of the Design & Construction Supervision Consultants | PMU's Environment Specialist   | ADB through Project Director |
| Final                         | Environment team of the Design & Construction Supervision Consultants | Reviewed by ESU of EMU   | ADB through Project Director |

#### A.1.4 Training Schedule

Environmental training will form part of the Environment Management Plan. The training will be conducted for all personnel involved in the subprojects works. The key objective of training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the Subprojects. The trainings to the staff will help in communicating environmental related restrictions specified in the EMP. The contractors will be primarily responsible for providing environmental training to all subprojects personnel on potential environmental issues of the Subprojects. Responsibility of trainings related to public safety lies with PMU. In addition to the training specified in the training log, special/ additional trainings will be provided during the subproject's activity.

#### A.1.5 Implementation Estimated Budget

Contractors will be responsible for the implementation for environmental mitigation plan. Most of the mitigation measures are covered in the engineering costs of the respective works. However, cost for some of the monitoring activities for one subproject are estimated below in Table 6.4<sup>1</sup>.

The below mentioned EMP budget will be included in Bill of Quantities (BoQ) of each subproject separately.

<sup>1</sup> Note: All the budgets are calculated in 2017 without any escalation rates and taxes. Actual budget will be provided by the Contractor at the time of implementation.

**Table 6.4: Implementation Estimated Budget<sup>2</sup>**

| Item No                     | Item Description      | Parameters   | Frequency | Rate (Rs) | As per Contract Amount |                |
|-----------------------------|-----------------------|--|-----------|-----------|------------------------|----------------|
|                             |                       |  |           |           | Quantity               | Amount         |
| 1                           | Air Testing at site   | 7. Carbon Monoxide (CO)<br>8. Sulfur Dioxide (SO <sub>2</sub> )<br>9. Nitric Oxide (NO)<br>10. Nitrogen Dioxide (NO <sub>2</sub> )<br>11. PM <sub>10</sub><br>12. PM <sub>2.5</sub>  | Quarterly | 8000      | 4/12 Months            | 32,000         |
| 2                           | Noise Testing at site | 1. Noise   | Quarterly | 1000      | 4/12 Months            | 4,000          |
| 3                           | Water Testing in Lab  | 16. Total Coli form<br>17. E. coli<br>18. pH<br>19. Total Dissolved solids (TDS)<br>20. Total Hardness as CaCO <sub>3</sub><br>21. Sodium<br>22. Potassium<br>23. Sulphate<br>24. Chloride<br>25. Alkalinity<br>26. Color<br>27. Odor<br>28. Taste<br>29. Nitrogen-Nitrates<br>30. TSS | Quarterly | 11000     | 8/12 Months            | 88,000         |
| <b>Total</b>                |                       |  |           |           |                        | <b>124,000</b> |
| <b>Contingency cost @5%</b> |                       |  |           |           |                        | <b>6,200</b>   |
| <b>GRAND TOTAL</b>          |                       |  |           |           |                        | <b>130,200</b> |

### Third Party Monitoring

The purpose of third-party monitoring is to ensure that the subprojects is implemented with the due concern for Environment and Social Safeguards according to ADB's Safeguards Policy Statement (SPS) 2009, and specifically to ensure that these issues are adequately addressed in compliance with the approved EIA/IEE reports and Environment Management plan (EMP). The third-party monitoring consultant will check / validate these reports during the

<sup>2</sup> The project will not cause cutting of trees, the plantation is suggested to improve biological environment of the area.



construction phase of the subprojects to ADB and also the Subprojects Completion Report.

As per TOR of the Contract the Third-Party Consultant will perform the following key tasks.

- i. review the sub-project's environmental performance to ensure that it complies with the national environmental legislation, requirements under Pakistan Environmental Protection Act, ADB's environmental safeguards as stipulated in Safeguard Policy Statement (SPS) and relevant environmental documents (IEE, EIA, Site specific EMP, Environmental Assessment and Review Framework);
- ii. monitor and participate in selected sub-projects' design and construction stage consultations;
- iii. monitor the performance of consultants in delivering the services and the performance of EA/PMU/PIUs and IAs in delivering their roles and responsibilities so that the subprojects stays compliant with ADB environmental safeguards;
- iv. monitor on sample basis EMP compliance at a construction site;
- v. in the case of unpredicted environmental impacts occurring during project implementation, provide guidance on the preparation of a corrective action plan, and monitor its implementation;
- vi. support the PMU in information sharing and disclosure of environmental safeguard documents, training on environmental management, and health and safety aspects to project staff;
- vii. if required, participate in the ADB project review missions to assist in due diligence reviews and analyses;
- viii. identify implementation capacities gaps, recommend improvements and troubleshooting to address bottlenecks and emerging issues that affect project management;

The Consultant will deliver (a) third party monitoring detailed plan in consultation with the EA, PMU, PIU and IAs; (b) biannual external environment safeguards monitoring report; and (c) collate and provide input to the final TA report. The Consultant will report to ADB Project Team Lead in PRM Islamabad.